

What is claimed is:

- 1    1.    A method of operation within a data processing system, the method comprising:  
2        receiving a request to execute a first function;  
3        executing a second function if the first function is defined to return data in a first  
4            type of data structure, the second function, when executed, returning  
5            formatting information that indicates an arrangement of fields of data within  
6            the first type of data structure;  
7        executing the first function to obtain a collection of data formatted according to the  
8            first type of data structure; and  
9        organizing the collection of data according to the formatting information returned  
10        by the second function.
- 1    2.    The method of claim 1 wherein receiving a request to execute a first function  
2        comprises receiving a request that indicates a data source to be accessed by the first  
3        function.
- 1    3.    The method of claim 2 wherein receiving a request that indicates a data source  
2        comprises receiving a uniform resource locator (URL) that indicates the data  
3        source.
- 1    4.    The method of claim 1 wherein executing the second function if the first function is  
2        defined to return data in a first type of data structure comprises executing the  
3        second function if a predetermined keyword is specified as a data return type for the  
4        first function.
- 1    5.    The method of claim 1 wherein executing the second function if the first function is

2 defined to return data in a first type of data structure comprises executing the  
3 second function if the first function is defined to return data in an array of data  
4 elements.

1 6. The method of claim 5 wherein the data elements in the array correspond to rows of  
2 a database table, respectively.

1 7. The method of claim 6 wherein the formatting information indicates an  
2 arrangement of columns within the database table.

1 8. The method of claim 5 wherein executing the first function to obtain a collection of  
2 data formatted according to the first type of data structure comprises executing the  
3 first function to obtain the array of data elements.

1 9. The method of claim 1 wherein the formatting information indicates an  
2 arrangement of rows and columns of a database table and wherein organizing the  
3 collection of data according to the formatting information comprises tabulating the  
4 collection of data according to the arrangement of rows and columns.

1 10. A method of executing a function in a database management system, the method  
2 comprising:  
3 receiving a request to execute a first function that returns a predetermined data type,  
4 the predetermined data type including an array of aggregate data values;  
5 executing a second function to obtain formatting information that describes an  
6 arrangement of component data values within each of the aggregate data  
7 values;  
8 executing the first function to obtain the array of aggregate data values; and

9        returning the array of aggregate data values in a data structure that includes the  
10                component data values indicated by the formatting information.

1    11.    The method of claim 10 wherein executing the first function to obtain the array of  
2                aggregate data values comprises executing the first function after executing the  
3                second function.

1    12.    The method of claim 10 wherein executing the first function to obtain the array of  
2                aggregate data values comprises executing the first function before executing the  
3                second function.

1    13.    The method of claim 10 wherein executing the second function to obtain formatting  
2                information that describes the arrangement of component data values comprises  
3                executing the second function to obtain a list of attributes that correspond to the  
4                component data values, each of the attribute including a name and a data type.

1    14.    The method of claim 13 wherein returning the array of aggregate data values in a  
2                data structure that includes the component data values indicated by the formatting  
3                information comprises returning each of the aggregate data values as a respective  
4                set of the component data values.

1    15.    The method of claim 14 wherein each of the component data values has the name  
2                and data type of the corresponding attribute.

1    16.    A system comprising:  
2                a processing entity; and  
3                a memory coupled to the processing entity and having program code stored therein

4           which, when executed by the processing entity, causes the processing entity  
5           to:  
6           receive a request to execute a first function included in the program code;  
7           execute a second function included in the program code if the first function is  
8           defined to return data in a first type of data structure, the second  
9           function, when executed, returning formatting information that indicates  
10          an arrangement of fields of data within the first type of data structure;  
11          execute the first function to obtain a collection of data formatted according to  
12          the first type of data structure; and  
13          organize the collection of data according to the formatting information  
14          returned by the second function.

1   17.   The system of claim 16 wherein the processing entity comprises a plurality of  
2          processors coupled to one another in a network.

1   18.   The system of claim 17 wherein the memory comprises a plurality of sets of storage  
2          devices, each set of storage devices being coupled to at least one of the processors  
3          and including at least one non-volatile storage device.

1   19.   A system comprising:  
2          a processing entity; and  
3          a memory coupled to the processing entity and having program code stored therein  
4                  which, when executed by the processing entity, causes the processing entity  
5                  to:  
6                  receive a request to execute a first function that returns a predetermined data  
7                  type, the predetermined data type including an array of aggregate data

8 values;  
9 execute a second function to obtain formatting information that describes an  
10 arrangement of component data values within each of the aggregate data  
11 values;  
12 execute the first function to obtain the array of aggregate data values; and  
13 return the array of aggregate data values in a data structure that includes the  
14 component data values indicated by the formatting information.

1 20. The system of claim 19 wherein the processing entity comprises a plurality of  
2 processors coupled to one another in a network.

1 21. The system of claim 20 wherein the memory comprises a plurality of sets of storage  
2 devices, each set of storage devices being coupled to at least one of the processors  
3 and including at least one non-volatile storage device.

1 22. A computer-readable medium carrying one or more sequences of instructions  
2 which, when executed by one or more processors, causes the one or more  
3 processors to:  
4 receive a request to execute a first function included in the one or more sequences  
5 of instructions;  
6 execute a second function included in the one or more sequences of instructions if  
7 the first function is defined to return data in a first type of data structure, the  
8 second function, when executed, returning formatting information that  
9 indicates an arrangement of fields of data within the first type of data  
10 structure;  
11 execute the first function to obtain a collection of data formatted according to the

12 first type of data structure; and  
13 organize the collection of data according to the formatting information returned by  
14 the second function.

1 23. A computer-readable medium carrying one or more sequences of instructions  
2 which, when executed by one or more processors, causes the one or more  
3 processors to:  
4 receive a request to execute a first function that returns a predetermined data type,  
5 the predetermined data type including an array of aggregate data values;  
6 execute a second function to obtain formatting information that describes an  
7 arrangement of component data values within each of the aggregate data  
8 values;  
9 execute the first function to obtain the array of aggregate data values; and  
10 return the array of aggregate data values in a data structure that includes the  
11 component data values indicated by the formatting information.